United States Patent [19]

Root

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[54] **AIR DUCT ACCESS DOOR**

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[52] **U.S. Cl.** **49/363,** 29/513, 49/388, 49/501, 49/504, 98/114

[51] **Int. Cl.** **E05f 11/12**

[58] **Field of Search** 49/504, 463, 501, 465, 49/388; 29/513, 163.5; 52/200, 205, 213, 208; 16/176; 98/114; 285/424

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[57] **ABSTRACT**

A closure structure for disposition over a window in the wall of an air duct is provided to allow access into the duct. A rectangular frame member is positioned to surround the window in the air duct and is secured along the perimeter of the window by a plurality of flanges which project from the frame transversely of the wall. Each of the flanges has a line of weakness proximal the wall and is manually bendable along this line to a position contiguous the wall to secure the frame member. The two flanges located adjacent each corner of the frame member comprise starter tabs which have substantially less resistance to deformation along their respective lines of weakness than the other flanges thus allowing the frame member to be held in place relative to the wall while the starter tabs are bent into position to hold the frame in place. The remaining flanges may then be bent into place to securely and permanently hold the frame member. An elongated hinge pin is telescopically received by the frame member and the door for mounting the door for swinging movement relative to the frame member. This pin is removable from the frame by simply pulling upwardly to thereby remove the door. This allows greater access to the duct.

5 Claims, 6 Drawing Figures

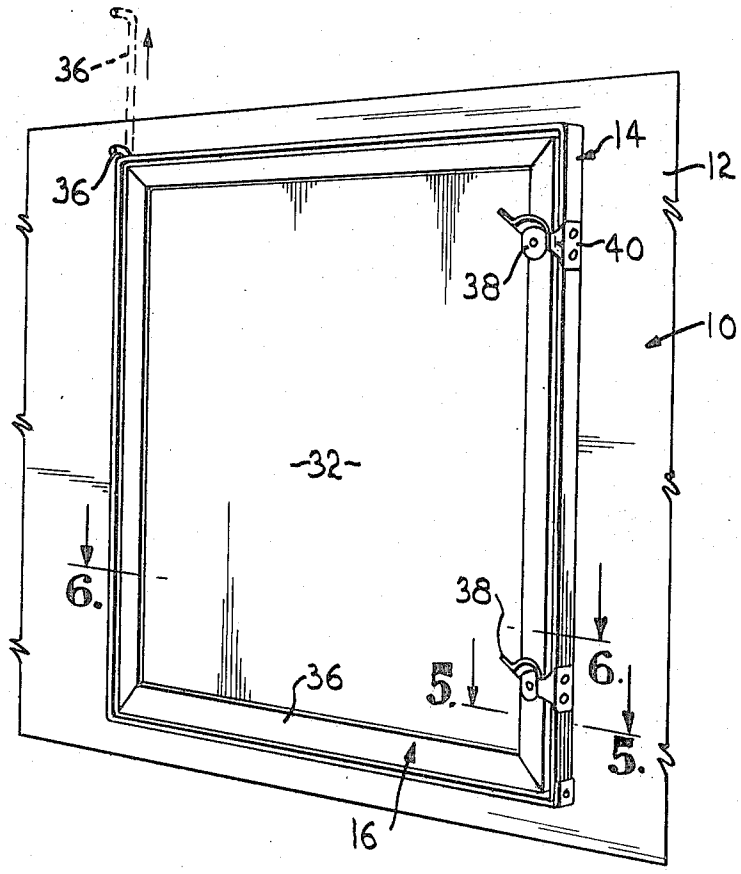


Fig. 1.

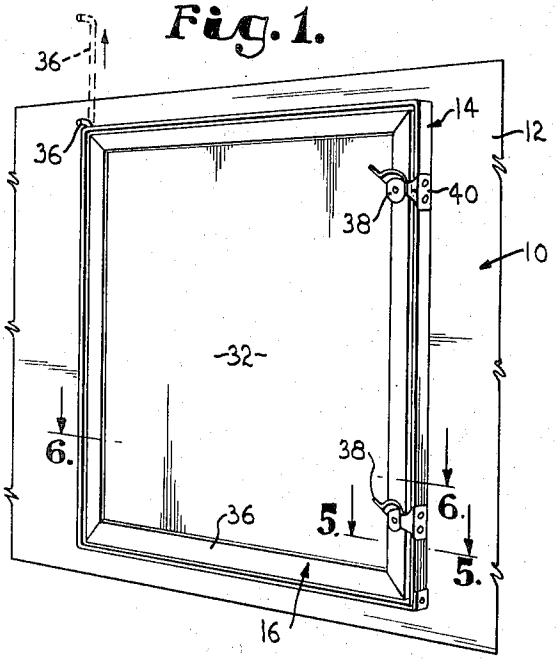


Fig. 2.

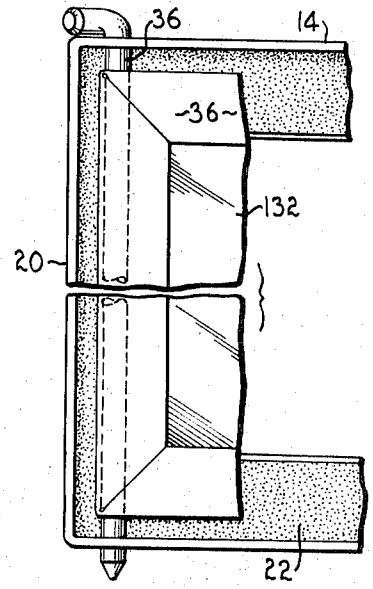


Fig. 3.

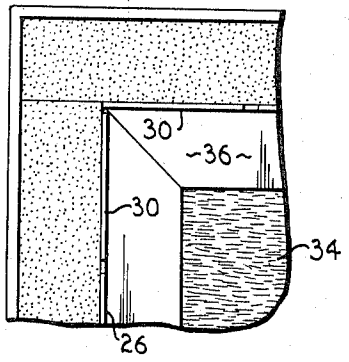


Fig. 4.

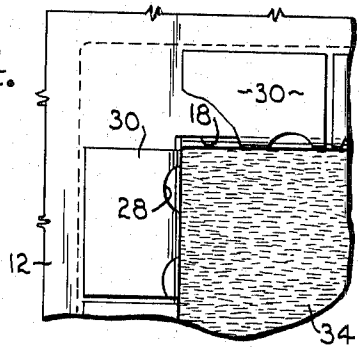


Fig. 5.

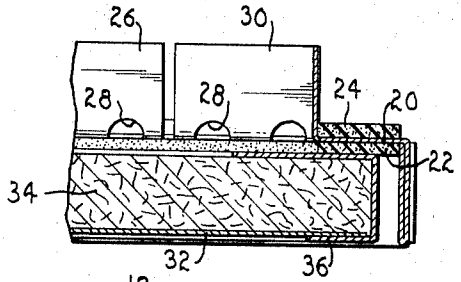
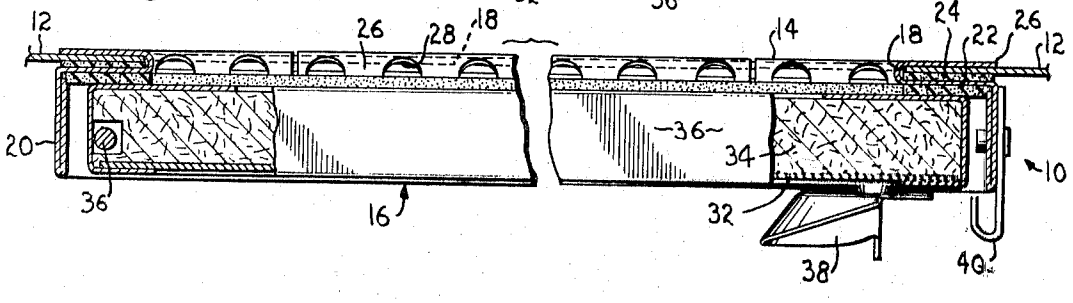


Fig. 6.



AIR DUCT ACCESS DOOR

This invention relates generally to closure structures and, more particularly, to a structure providing ready access to the interior of an air duct.

It is, of course, common practice to provide large air ducts in modern building construction for heating, cooling, and air pressure control. To achieve the desired objectives, it is necessary to include equipment in the ducts for controlling the air flow. Additional equipment is required in many instances for closing the passageway provided by the ducts in the event of fire or smoke in the building. Access must normally be provided to the interior of the air ducts to allow for servicing of any equipment located therein.

It has heretofore been known to provide closure structures which can be fitted into a window cut in an air duct and secured to the side of the air duct by bendable flange tabs which are manually bent into position. It has, been inherent in the construction of such prior art devices that the bendable flange tabs do not securely lock the structure relative to the side of the air duct. If the structure is subjected to any dislodging forces whatsoever, it becomes loose and may provide problems of noise and air leaks.

It is, therefore, an object of the present invention to provide closure structure for a window in an air duct which structure can be secured to the side of the duct by bendable flanges, and wherein the flanges are provided with a special line of weakness proximal the side of the duct to assure bending of the flanges in a manner which will securely and permanently mount the structure relative to the air duct.

As a corollary to the above object, one of the aims of this invention is to provide closure structure utilizing two or more starter tabs having substantially less resistance to deformation than the other flanges thereby allowing the structure to be manually held in position and the starter tabs meant to lock the structure in this position prior to the remaining flanges being bent for permanently securing the structure.

Another disadvantage of closure structures for air ducts constructed according to the teachings of the prior art has been the inability to provide a door which is both swingable relative to the duct and completely removable. It is, therefore, another objective of this invention to provide closure structure having a door which is swingable relative to the frame about an axis presented by an elongated hinge pin, and wherein the hinge pin is removable to accommodate complete removal of the door for improved access to the interior of the air duct.

Still another one of the objectives of this invention is to provide closure structure for an air duct as described in the foregoing objects which includes a layer of insulation for the door and seals between the structure and the side of the air duct, and between the door and frame of the structure whereby there is neither thermal loss nor air flow through the closure structure.

In the drawing:

FIG. 1 is a perspective view of the side of an air duct having the closure structure of the present invention inserted within a window located therein;

FIG. 2 is a fragmentary front elevational view, similar to FIG. 1, on an enlarged scale with the removable hinge pin which mounts the door relative to the frame shown partially in phantom and an alternative door panel construction;

FIG. 3 is a fragmentary rear elevational view of the closure structure shown in FIG. 1 prior to the bending of the flanges against the side of the air duct;

FIG. 4 is another rear elevational view similar to FIG. 3 and illustrating how the starter tab flanges are bent against the side of the duct;

FIG. 5 is a horizontal cross-sectional view taken along line 5—5 of FIG. 1; and

FIG. 6 is a horizontal cross-sectional view taken along line 6—6 of FIG. 1.

Referring initially to FIGS. 1, 5 and 6, the closure structure of the present invention is designated generally by the numeral 10 and is shown in FIG. 1 disposed in a wall 12 which, it is to be understood, is the wall of an air duct. Structure 12 comprises a frame member 14 and a door coupled with the frame and designated generally by the numeral 16.

As best illustrated in FIGS. 4 and 6, side 12 has had a generally rectangular section removed to present a window in the side, the perimeter of which is designated by the numeral 18. Frame member 14 is likewise of generally rectangular configuration and comprises an L-shaped channel section 20 that is adapted to be positioned to surround the window in wall 12. First and second sealing strips 22 and 24 are disposed on opposite sides of the leg of section 20 which is parallel to wall 12.

Projecting outwardly from section 20 in a direction transverse to the plane of the wall and integral with the channel section are a plurality of bendable flanges 26. Each flange is bendable through an arc of 90° along a line of weakness presented by a plurality of perforations 28. It is to be noted that the perforations in flanges 26 are located at the line of juncture of the flanges with channel section 20 and are of a size such that when frame member 14 is positioned in the window defined by perimeter 18 the line of weakness is located proximal wall 12. This is best illustrated in FIG. 6.

Each perforation 28 is separated from an adjacent perforation by an integral portion of the flanges 26.

At each corner of frame member 14 a pair of specially constructed starter tab flanges 30 are located to facilitate positioning of the frame member within the window of side 12. The starter tabs 30 have a much greater proportion of perforations 28 relative to that portion of the tabs which is integral with section 20 than do the other flanges. This results in starter tabs 30 having substantially less resistance to deformation than the other flanges.

Referring additionally to FIGS. 2 and 4, door 16 is constructed to fit within channel section 20 and comprises a non-transparent panel 32 disposed in back-to-back relationship with a layer of insulation 34. The panel is held in tight compressed relationship relative to insulation 34 by a rectangular retaining section 36 of generally U-shaped cross section. In some instances, it may be desirable to replace panel 32 and insulation 34 with a transparent panel 132 as illustrated in FIG. 2. In either case, frame member 14 and door 16 telescopically receives an elongated hinge pin 36. Door 16 is, of course, swingable between open and closed positions about the vertical axis presented by hinge pin 36 and the latter may be removed from the door and frame member by simply pulling upwardly as indicated in FIG. 1.

A pair of cam lock assemblies having rotatable camming components **38** secured to door **16** and complemental latch components **40** secured to frame member **14** are utilized to lock door **16** in a closed position.

When structure **10** is utilized as an access door for an air duct or other similar structures, the window defined by perimeter **18** is first cut in side **12** in a conventional manner. With door **16** either in an open position or removed from frame **14,** the latter is positioned in the window by a workman. Since the size of the window will normally not perfectly complement the transversely extending flanges **26,** it is highly desirable to be able to position frame **14** relative to wall **12** in a proper manner. This is accomplished by holding the frame with one hand while starter tabs **30** located in each corner are manually bent into a position contiguous wall **12.** Since tabs **30** have substantially less resistance to deformation than flanges **26,** they may be easily bent by a workman utilizing only one hand while holding frame **14** in position with the other hand. Next, the remaining flanges **26** are bent contiguous wall **12** by the workman utilizing both hands since the flanges have substantially greater resistance to deformation than the starter tabs. A characteristic of prior art devices is that the bendable flanges heretofore utilized to secure a frame to a wall have not had any well defined line of weakness and their weakest point has inherently been at a location spaced slightly from the adjacent side wall. This results in the flanges not lying flat against the sides but instead contacting the side over only a portion of the width of the flanges and extending outwardly from the sides at a slight angle. A definite line of weakness is, on the other hand, defined by perforations **28** and flanges **26** and tabs **30** of the present invention. This line of weakness is proximal side **12** of the air duct and thus assures that when flanges **26** are bent into a position contiguous wall **12** they will lock flat against the wall in a plane parallel to the plane of the wall and with contact between the flanges and the wall over the entire width of the flanges. Such a construction provides greatly superior holding power for flanges **26** and assures that frame **14** will remain tightly in place indefinitely.

Manifestly, sealing strips **22** and **24** assure that there is no air loss at the closure structure. Similarly, insulation **34** prevents thermal losses at this location. In those instances where it is desirable to be able to continuously observe equipment located in the air duct, transparent panel **132** is utilized.

When it is necessary for a workman to enter the air duct, greatly improved access is provided as a result of removable hinge pin **36.** By telescoping the hinge pin out of the frame and door, door **16** may be completely removed. This also eliminates the danger of the door becoming damaged or a person being injured when striking an open door. On the other hand, if it is only necessary to look inside the air duct, this may be easily and quickly accomplished by swinging door **16** open without the need to remove it from the frame. Cam locks **38** assure adequate sealing of door **16** when it is in its closed position.

While the invention has been particularly described with reference to an air duct, it will be appreciated that the invention may find application as a closure structure for other types of walls.

Having thus described the invention, I claim:

1. Closure structure to be disposed over and secured along the perimeter of a window in a wall for providing access to the other side of the wall, said structure comprising:

a frame member adapted to be positioned to surround said window on one side of said wall;

a door coupled with the frame member and movable with respect to the latter between an open and a closed position;

lock means for holding said door tightly against said frame member;

a plurality of flanges integral with said frame member and projecting from the latter on the other side of said wall when the frame member is in position,

said flanges being characterized by a plurality of perforations disposed in linear alignment with each other and substantially aligned with said other side of the wall and interrupted by a plurality of integral portions of said flanges disposed between adjacent perforations,

said flanges being manually bendable through an arc of approximately 90° along the line presented by said perforations to a position in contact with said wall on said other side thereof;

a first sealing strip secured to said frame member for forming a seal between the member and said one side of said wall; and

a second sealing strip secured to said frame member for forming a seal between said door and the frame member.

2. The invention of claim **1,** including an elongated hinge pin telescopically received by the frame member and the door for mounting the door for swinging movement relative to the frame member, said pin being removable from the frame whereby said door is also removable to provide greater access through the window.

3. The invention of claim **1,** wherein said door comprises a non-transparent panel and including an insulating layer for said door.

4. The invention of claim **1,** wherein said door comprises a transparent panel.

5. The invention of claim **1,** wherein at least two of said flanges comprise starter tabs disposed at opposed points on said frame, each of said starter tabs having less resistance to deformation along its line of perforations than the other flanges whereby the starter tabs may be easily bent into position as the frame member is manually held in place realtive to the wall to position the frame member, and the remaining flanges bent into position to secure said member to the wall.

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